

*Montana*  
*Comprehensive Assessment*  
*System (MontCAS, Phase 2)*  
*Criterion-Referenced Test (CRT)*

COMMON CONSTRUCTED-RESPONSE ITEM RELEASE  
MATHEMATICS, GRADE 8

2008



OFFICE OF PUBLIC INSTRUCTION

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# Mathematics

## Session 1 (No Calculator)

You may NOT use a calculator during this session.

Write your answer in the space provided for it in your Student Response Booklet. Show all of your work.

23. Sheryl compared these two formulas for making a dirt mix of peat moss and potting soil.

Formula 1	Formula 2
<u>To make 5 cups of dirt mix:</u> Mix 1 cup peat moss with 4 cups potting soil	<u>To make 9 cups of dirt mix:</u> Mix 2 cups peat moss with 7 cups potting soil

- In Formula 1, what percent of the dirt mix is made with **potting soil**? Show or explain how you found your answer.
- Determine which formula has the highest percentage of **peat moss**. Show or explain how you found your answer.
- Sheryl needs 45 cups of dirt mix. She decides to use Formula 2. How many cups of **peat moss** does she need to make 45 cups of dirt mix? Show or explain how you found your answer.

## Scoring Guide

Score	Description
4	4 points
3	$3 - 3\frac{1}{2}$ points
2	$2 - 2\frac{1}{2}$ points
1	$\frac{1}{2} - 1\frac{1}{2}$ points OR Response shows minimal understanding of problem.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

## Scoring Notes

Part a: 1 point for correct answer, **80%**, with correct work or explanation

OR

$\frac{1}{2}$  point for correct answer

or

$\frac{1}{2}$  point for correct explanation or strategy

Part b: 1 point for correct work or explanation showing that Formula 2 has the higher percent of peat moss

OR

$\frac{1}{2}$  point for correct percents for both formulas without work or explanation

or

$\frac{1}{2}$  point for correct explanation or strategy for finding at least one formula's percent

Part c: 2 points for correct answer, **10 cups**, with correct work or explanation

OR

1 point for correct answer

or

1 point for correct proportion

or

1 point for correct strategy with minor computational error

**Sample Response:**

Part a: 4 parts out of 5 parts is  $\frac{4}{5} = 80\%$  potting soil.

Part b: Dirt mix made from Formula 1 has 1 out of 5 parts that is peat moss.

$$\frac{1}{5} = 20\% \text{ peat moss}$$

Dirt mix made from Formula 2 has 2 out of 9 parts that are peat moss.

$$\frac{2}{9} = 22\% \text{ peat moss}$$

Dirt mix made from Formula 2 has the highest percent of peat moss.

Part c:  $\frac{2}{9} = \frac{x}{45}$ ,  $9x = 90$ ,  $x = 10$  cups of peat moss

a.  $\frac{4c}{5c} \rightarrow$  potting soil  
 $\frac{4}{5} \rightarrow$  dirt mix

$$\frac{4}{5} = 5 \overline{) 40} \begin{array}{r} 8 \\ 40 \\ \hline 0 \end{array}$$

$80 \rightarrow$  move the decimal

**80%**

peat moss needed

c.  $\frac{Kx}{45} = \frac{2}{9} \rightarrow$  peat moss  
dirt mix  $\frac{Kx}{45} = \frac{2}{9} \rightarrow$  dirt mix

$$\frac{90}{9} = \frac{9x}{9}$$

$$10 = x$$

**10 cups of peat moss**

b. Formula 2

$$\frac{2}{9} \rightarrow \text{peat moss} \quad 9 \overline{) 20} \begin{array}{r} 2 \\ 18 \\ \hline 20 \end{array} = 22$$

$$\frac{1}{5} \rightarrow \text{dirt mix} \quad 5 \overline{) 10} \begin{array}{r} 2 \\ 10 \\ \hline 0 \end{array} = 20$$

22.5%      20%

Formula 1

$$\frac{1}{5} \rightarrow \text{peat moss} \quad 5 \overline{) 10} \begin{array}{r} 2 \\ 10 \\ \hline 0 \end{array} = 20$$

$$\frac{2}{9} \rightarrow \text{dirt mix} \quad 9 \overline{) 20} \begin{array}{r} 2 \\ 18 \\ \hline 20 \end{array} = 22$$

20%      22.2%  $\geq 20$

**Formula 2**

$$A. \frac{4}{5} \times \frac{20}{20} = \frac{80}{100} = 80\%$$

$$B. \frac{1}{5} \times \frac{20}{20} = \frac{20}{100} = 20\% \text{ or } \frac{2}{10} \text{ or } .20 \text{ or } .22$$

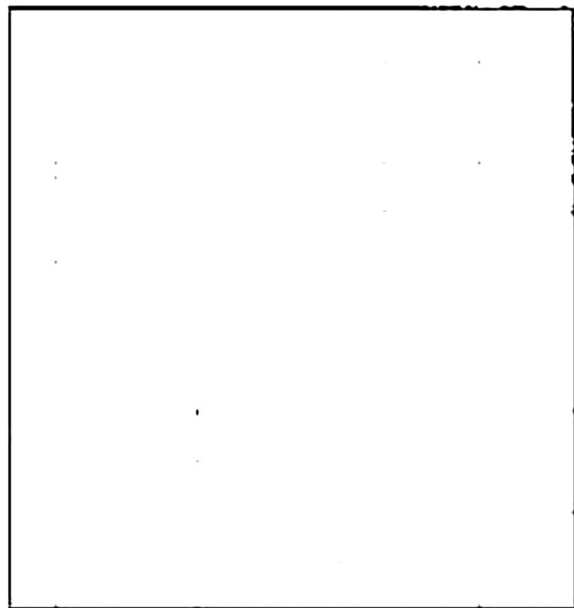
Formula 2 because  
22 percent is greater than  
20 percent.

$$C. \frac{45 \text{ cups}}{9 \text{ cups}} = 5 \text{ cups}$$

$$2 \times 5 = 10$$

10 cups of peat  
moss

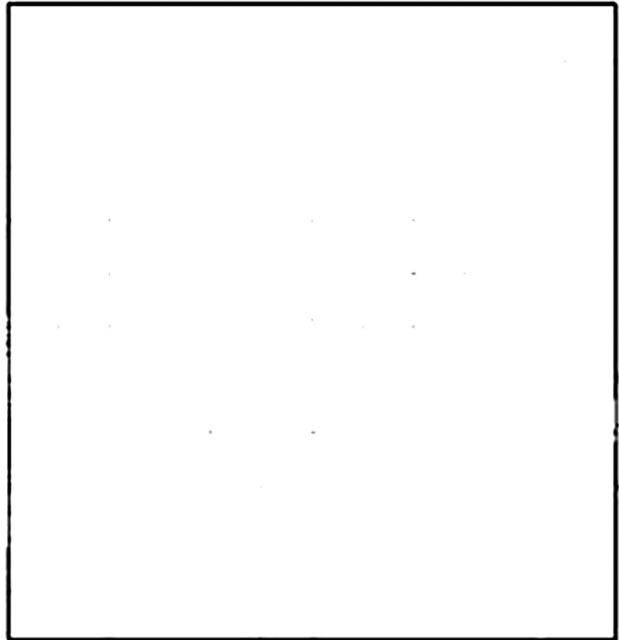
$$\begin{array}{r} 9 \overline{) 2.00} \\ \underline{18} \phantom{00} \\ 20 \phantom{0} \\ \underline{18} \phantom{0} \\ 2 \phantom{0} \end{array}$$



Score Point 4

Sample 3

$$\begin{aligned} a &= 80 \text{ percent} & \frac{4}{5} &= \frac{80}{100} \\ b &= \text{four mls} & \frac{1}{5} &< \frac{2}{9} \\ C &= 10c & 9 \overline{)45} & \quad 2 \text{ cups pent mms} \times 5 = 10c \end{aligned}$$





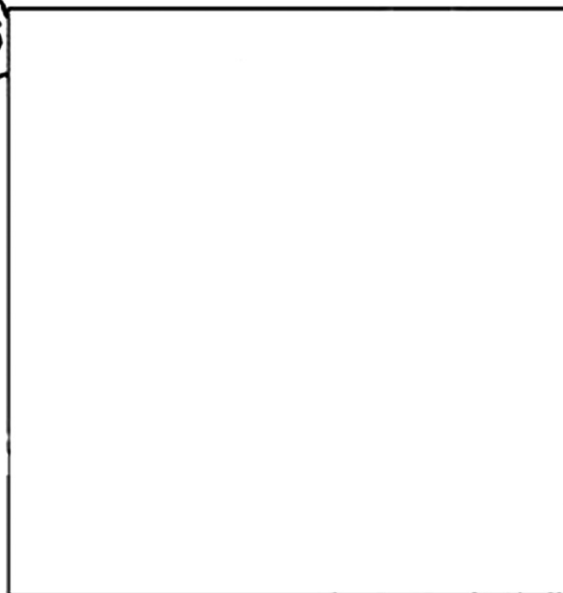
14285  
a.  $\frac{4}{5} = 80\%$  potting soil

b.  $\frac{1}{5} = 20\%$ ,  $\frac{2}{7} = 28.57\%$  Formula 2 has

the highest percentage of peat moss

c. 10 cups of peat moss

I multiplied 9 by 5 and multiplied the others by 5. and got 10/35.



Score Point 2

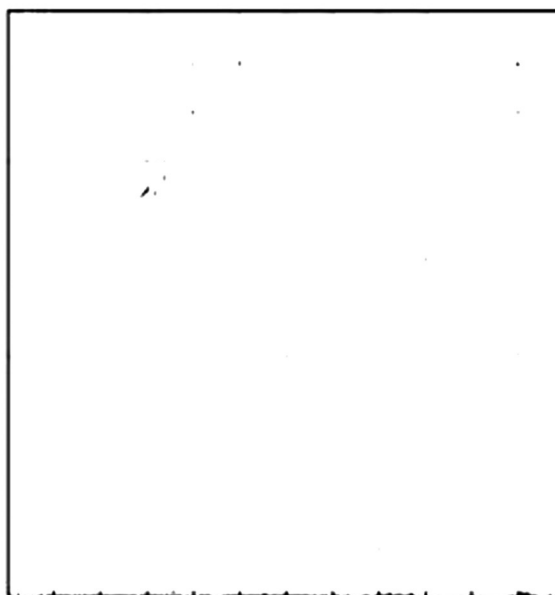
Sample 1

a)  $4/5 = 80\%$   $4/5 = 8/10 = 80\%$

b) Formula 2  $100 \div 9 = 11.1$   $7/a = 22\%$   
 $1/5 = 2/10 = 20\%$

c)  $45 \times 2 = 90$

20 caps of peat moss



Score Point 2

Sample 2

Handwritten work for Score Point 2, Sample 2:

At the top, three items are boxed and labeled:

- a. 40%
- b. Formula 1
- c. 10 cups

Below these, there are several mathematical calculations:

1. A vertical addition problem:

$$\begin{array}{r} +1 \\ \hline 6 \\ +9 \\ \hline 10 \\ 4 \\ \hline 10 \end{array}$$

2. A division problem:

$$\begin{array}{r} 9 \overline{) 45} \\ \underline{45} \\ 0 \end{array}$$

3. A multiplication problem:

$$\begin{array}{r} 2 \\ \times 5 \\ \hline 10 \end{array}$$

4. A large empty rectangular box on the right side of the work area.

Ⓐ .8% of the potting soil is dirt mix.

I found my answer by:

$$\begin{array}{r} 8 \\ 5 \overline{) 40} \end{array}$$

Ⓑ Formula 2 has the highest percentage of peat moss, because 9 cup of dirt mix is more the 5 cups of dirt mix 2 cups is more than 1 cup.

Ⓒ she needs  $22\frac{1}{2}$  cups of peat moss if she decided to got with formula 2. I divided 45 by 2 and got  $22\frac{1}{2}$ .

$$\begin{array}{r} 22\frac{1}{2} \\ 2 \overline{) 45} \\ \underline{4} \phantom{0} \\ 05 \\ \underline{4} \phantom{0} \\ 1 \end{array}$$

My work is shown here

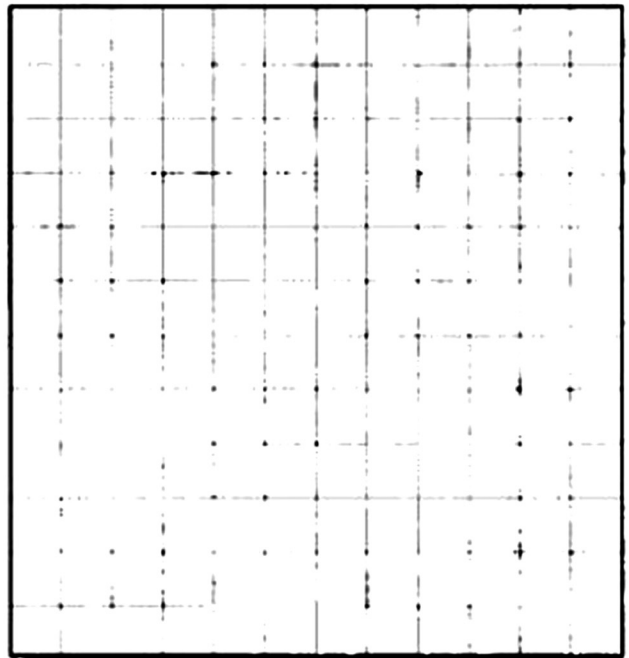
Score Point 1

Sample 2

A. 80% 4 out of five is 80%

B. Formula 2

C. 14-70 multiplied by 6.7



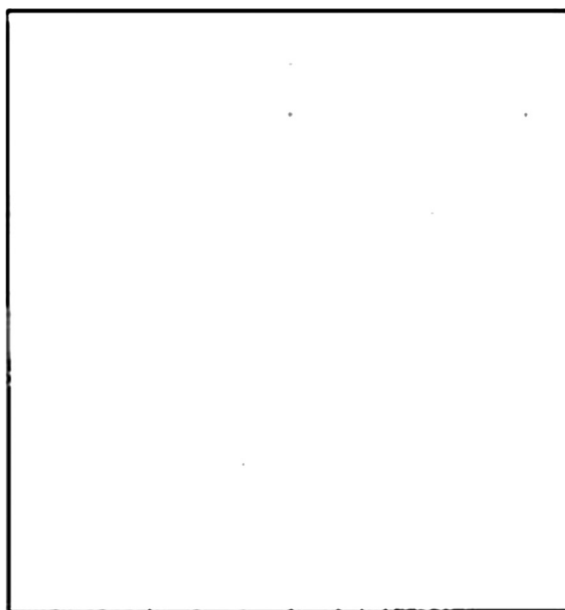
Score Point 0

Sample 1

a. in formula 1 the potting soil is used about 85 Percent  
and the Peat moss the other 15 Percent

b. formula 2 uses more Peat moss than formula 1 form. 2 7-2  
form 1 4-1 = 3 out of 5 5 out of 9

c.  $45 \div 3 = 15$  Sheryl would need 15 bags of Peat moss



Score Point 0

Sample 2

A  $5 \times 4 = 20\%$  A = 20% of dirt  
mix

B

B Formula 2

C 4 cups of dirt moss.

